

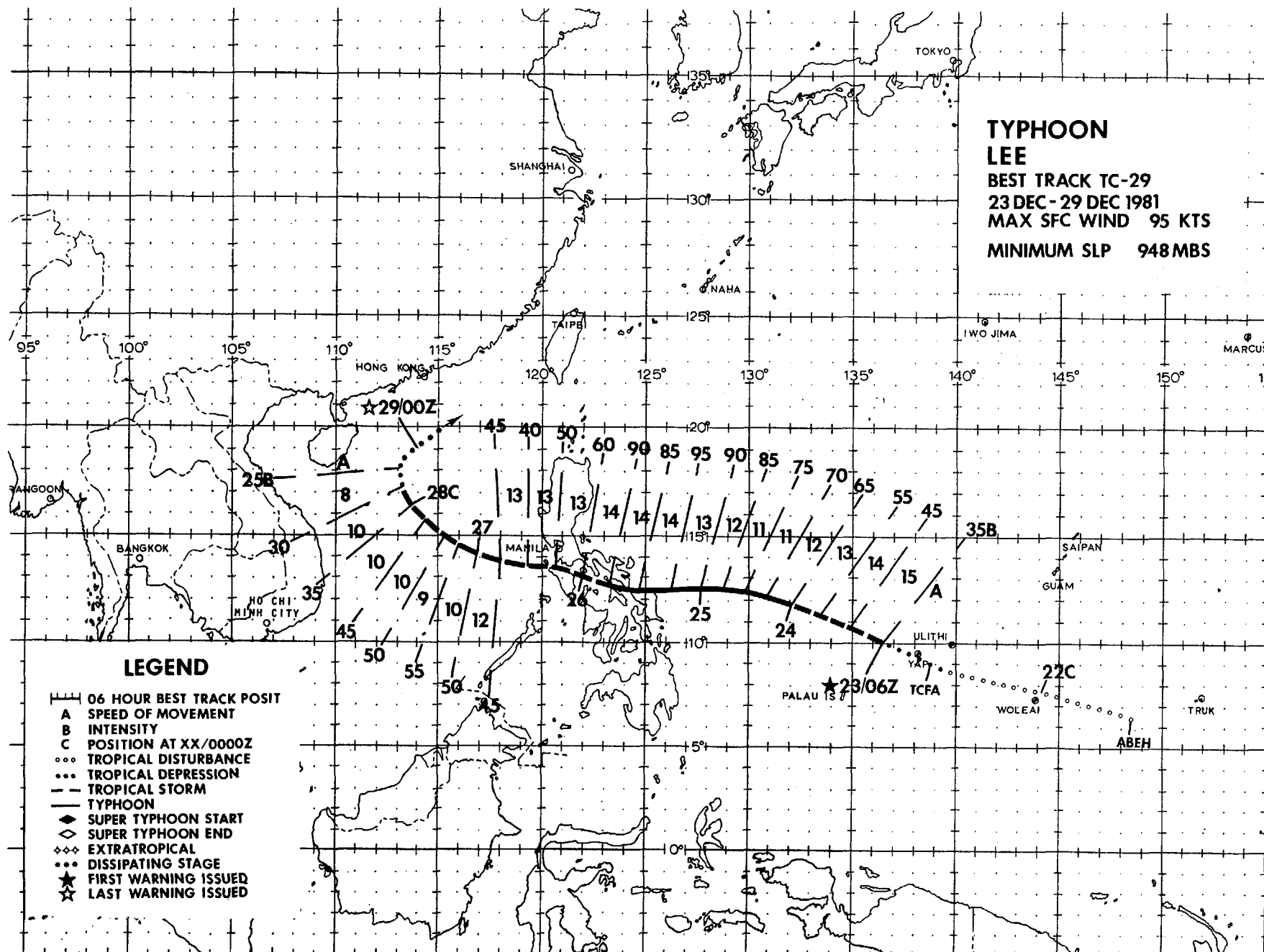
TYPHOON LEE

BEST TRACK TC-29

23 DEC - 29 DEC 1981

MAX SFC WIND 95 KTS

MINIMUM SLP 948 MBS



On 21 December, as Tropical Depression 28 (Kit) was dissipating in the western Philippine Sea, an area of convection began organizing west of Truk Atoll. Strong northerly winds, previously feeding into Kit, began moving toward the eastern Philippine Sea, thus closing the western end of the near-equatorial trough southwest of Guam. On 22 December, reconnaissance aircraft data indicated near-gale force tradewind easterlies had penetrated to 8N and to the south of the convective center. However, both the 220000Z 500 mb analysis and a portion of the 700 mb aircraft data indicated a mid-tropospheric trough was present southwest of Guam in a virtually convection-free region. A singular 700 mb height from the reconnaissance aircraft showed an extrapolated surface pressure of 1002 mb near 9N 143E. The aircraft reconnaissance mission was not able to thoroughly investigate this trough, thus it was not possible to determine whether or not a closed circulation had developed. By 221800Z, the convection had moved westward and was located close to the mid-tropospheric trough. At 222100Z, when Yap

(WMO 91413) reported a 5 mb pressure fall in a 9 hour period, a Tropical Cyclone Formation Alert was issued for the developing system.

The first warning was issued for Tropical Depression 29 when reconnaissance aircraft data at 220503Z located a closed circulation; at 221200Z, because of increased convective organization and reports of stronger tradewinds north of the cyclone, TD-29 was upgraded to Tropical Storm Lee. During the first 24 hours in warning status, Lee moved west-northwestward in response to a mid-latitude shortwave trough moving off of Asia. Once this trough moved on, Lee turned toward the west into the Philippines. Lee intensified rapidly, reaching typhoon strength just 18 hours after initial warning and, subsequently, attaining a peak intensity of 95 kt (49 m/sec) within 48 hours. Figure 3-29-1 shows Lee during this intensification period. However, shortly after reaching maximum intensity, Lee began crossing the Philippines and a rapid weakening trend followed. Just 24 hours after

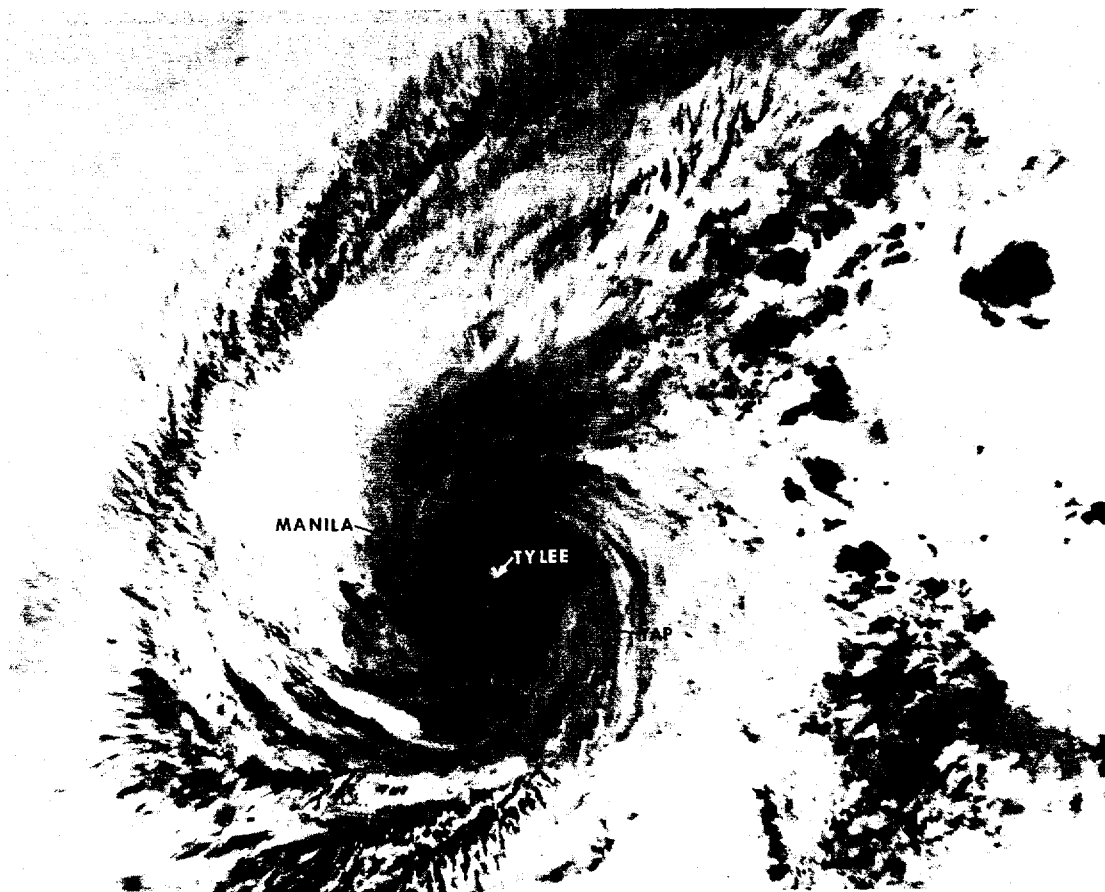


FIGURE 3-29-1. Typhoon Lee, now at 85 kt (44 m/sec), is intensifying rapidly while approaching the central Philippines. 12 hours later, aircraft data had Lee with a 948 mb surface pressure (95 kt (49 m/sec)), 241806Z December. (NOAA 7 infrared imagery)

reaching 95 kt (49 m/sec), Lee entered the South China Sea with an estimated intensity of 40 kt (21 m/sec).

The JTWC forecast tracks had accurately predicted a track between Mindoro and Luzon Islands, then into the South China Sea. Beyond this point, the track was much more difficult to forecast. The numerical prognostic fields were forecasting a deepening of a mid-latitude trough over central China and the subsequent development of a "Shanghai" low in the East China Sea. However, these same forecast fields were not weakening the prevailing northeasterly flow over the South China Sea in the lower-levels. Because the forecast significant pressure changes over eastern China would certainly affect Lee's westward movement, the option for a more northward track in the South China Sea was indicated as early as the fourth warning (240000Z). However, as Lee tracked westward, the forecasted deepening of the mid-latitude trough was delayed on each 12-hour numerical forecast series. At 262048Z, when reconnaissance aircraft located Lee still tracking westward and the deepening of the trough had still not materialized, the 261800Z warning was amended to show a more westward track toward central Vietnam and south of a small high over Hainan Island. Within 12 hours of the amended warning, surface/gradient level wind reports in the region showed a lessening of low-level wind speeds as the previously strong northeast monsoonal flow off of Asia moved eastward and more directly affected the Philippine Sea. Although not yet forecasted, the effects of the approaching mid-latitude trough were finally changing the synoptic situation and accordingly, Lee gradually inched toward a more northward track.

The aircraft data received on 26 December indicated a 990 nm minimum sea-

level pressure at Lee's center with a banding-type eye present. Although the banding feature remained for several days, Lee's surface pressure steadily climbed and reached 998 mb as reported by the 271406Z reconnaissance aircraft mission. On 27 December, satellite imagery began showing the effects of increased vertical wind shear on Lee; and by 280000Z, all of Lee's deep-layer convection and upper-level outflow had been advected well east of the low-level center. On the 28th, surface wind reports showed a weakening of Lee's circulation as surface pressures throughout the northern portion of the South China Sea continued to increase.

Despite Lee's more pronounced northward movement, it was not until the 280600Z warning that the JTWC abandoned the westward track forecast. Lacking throughout this period was an appreciation of how much the low-level wind regime had changed and that Lee was moving northward in the absence of any significant low-level steering. The westward track was continually supported by the usually reliable One-way Interactive Tropical Cyclone Model (OTCM/TCMO) which showed a slight northward jog before assuming a west-southwestward track. Finally, when fix-to-fix data from visual satellite imagery showed a northward movement in the six-hour period up to 280600Z, the JTWC forecast swung around to the north. Although the numerically forecast "Shanghai" low did not develop in the East China Sea, the effect of the mid-latitude trough on the low-level wind flow was a significant factor in Lee's northward movement, although somewhat delayed.

The final warning was issued at 290000Z when visual satellite imagery confirmed what synoptic data at 281200Z had indicated: Lee had essentially dissipated as a significant tropical cyclone. Figure 3-29-2 shows the remnants of Lee's circulation center located 150 nm (278 km) south of Hong Kong.

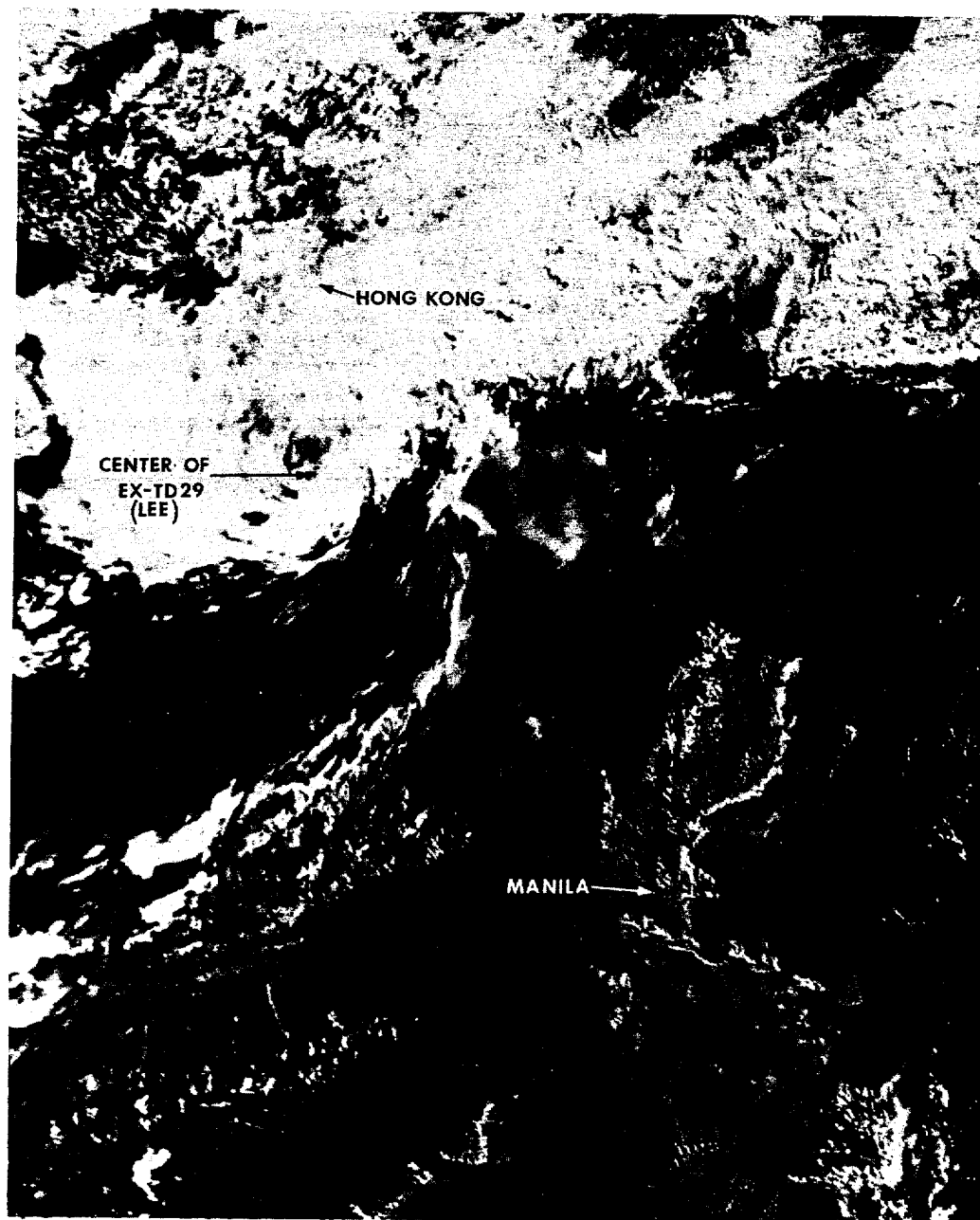


FIGURE 3-29-2. Once Typhoon Lee, now a weak small-scale circulation south of Hong Kong, 290604Z December. (NOAA 7 visual imagery)